

REMARKS

I. Status of the Claims

Claims 1-21 are currently pending. Claims 8-15 and 17-20 have been withdrawn. Claims 1-7, 16, and 21 are under examination and stand rejected.

By this amendment, Applicants amended claims 1, 16, and 21 to more particularly point out and distinctly claim that which Applicants consider to be the invention. Support for the amendments can be found in the originally filed specification, for instance, at paragraph [0023] and [0035] in U.S. Publication No. 2006/0022065 (hereinafter "the '065 publication"), which is the publication of the instant application. Thus, full written description support exists for the new-added claim language.

Applicants request reconsideration of the pending claims in view of the foregoing amendment and the following remarks.

II. Claim Rejections Over the Liu reference

Claims 1-5, 7, 16, and 21 are rejected under 35 U.S.C. § 102(e) as anticipated by, or in the alternative, under 35 U.S.C. § 103(a) over the Liu reference (U.S. Patent No. 7,195,742). See Office Action at 2-3. In particular, the Examiner asserts that "Liu teaches in col. 1-3 oxidizing CO in a refromate for use in a fuel cell and controlling the oxygen amount infed." *Id.* at 2. The Examiner further rejected claims 1-7, 16, and 21 under 35 U.S.C. § 103(a) over Liu. *Id.* Apparently referring to claim 6, the Examiner also alleges that Liu does not specify the anode, but that it is "an obvious expedient to provide hydrogen where it is needed/desired in a fuel cell system." *Id.*

With respect to claims 1-5, 7, 16, and 21, Applicants submit that it was not shown that the Liu reference discloses or suggests all the claim limitations in the rejected claims.

Regarding amended claim 1, the Liu reference does not teach or suggest “proportioning the air supplied amongst the air inlet points by providing a fixed dimension flow path from the manifold to each air inlet point so that the flow rate of an air flow supplied to one air inlet point differs from that of at least another air flow supplied to another air inlet point,” as recited in this claim. Rather, the Liu reference discloses “a preferential oxidation reactor and process wherein, advantageously, oxygen is evenly distributed through the reformat in the presence of a catalyst so as to more efficiently oxidize the carbon monoxide present in the steam.” See, the Liu reference, col. 2, lines 26-29. Specifically, the Liu reference discloses a tubular element in the catalyst bed that “flow through the sidewall [of a tubular element 16] remains substantially constant along the length of tubular element 16, thereby uniformly and evenly distributing the oxygen as desired.” *Id.* at col. 3, lines 18-27.

Therefore, rather than having the flow rate of an air flow supplied to one air inlet point differ from the flow rate of at least another air flow supplied to another air inlet point, as set forth in the amended claim 1, the Liu reference teaches having a uniform flow rate along the length of air supply tube, element 16. Thus, the Liu reference fails to teach or suggest the differing flow rate that is recited in claim 1.

Regarding the rejection to claims 16, which recites that “the flow rates of at least two air flows to their respective air inlet points are different,” the Liu reference teaches having a uniform flow rate along the length of air supply tube, element 16.

Likewise, claim 21 recites that “the volume of air sent to the first reformer air inlet and the volume of air sent to the second reformer air inlet” is of a the fixed ratio having “a value other than one.” The Liu reference, on the other hand, teaches having a uniform flow rate along the length of air supply tube, element 16.

For the reasons set forth above, Applicants submit that the Liu reference neither anticipates nor renders obvious the subject matter recited in claims 1, 16, or 21.

Claims 2-5 are dependent from claim 1 and are patentable over the Liu reference for at least the reasons that claim 1 is patentable. Applicants respectfully request the withdrawal of the rejections based on the Liu reference.

III. Claim Rejection over the Kahlich reference

Claims 1-7, 16, and 21 under 35 U.S.C. § 103(a) are rejected over the Kahlich reference: Kahlich, M.J., et al., “Preferential Oxidation of CO over Pt/ γ -Al₂O₃ and Au/ α -Fe₂O₃: Reactor Design Calculations and Experimental Results,” *Journal of New Materials for Electrochemical Systems*, 1: 39-46 (1998). See Office Action at 3. The Examiner asserted that “the Kahlich reference teaches plural inlets and how to calculate the oxygen demand.” *Id.* This alone, however, does not render the claimed invention obvious over the Kahlich reference.

Unlike claim 1, the Kahlich reference does not disclose whether the multiple air inlets are connected to one air manifold or not. Moreover, it does not suggest or disclose “proportioning the air supplied amongst the air inlet points by providing a fixed dimension flow path from the manifold to each air inlet point so that the flow rate of an air flow supplied to one air inlet point differs from that of at least another air flow supplied to another air inlet point,” as set forth in the amended claim 1.

Kahlich discloses a two-stage PROX reactor with the second stage having multiple O₂/air inlets. See Kahlich, Figure 7. Although Kahlich proposes a method for calculating a minimum amount oxygen in the second stage, it does not disclose or suggest how the air flow is divided among multiple inlets in the second PROX stage. *Id.* at 44.

Furthermore, Kahlich does not disclose the relationship between the amount of air to the first PROX stage and that to the second PROX stage. Rather, Kahlich only specifies that the CO concentration are controlled at about 1000 ppm after the first PROX stage and about 0 ppm after the second PROX stage. See Kahlich at page 43 and Figure 7. One skilled in the art would appreciate that, to arrive at these target concentrations, air feeds to the first and the second stage are necessarily independently controlled.

Therefore, the Kahlich reference requires individually controlling air flows to the first PROX stage and is silent regarding the distribution of air among multiple air inlets to the second PROX stage. It thus teaches away from “proportioning the air supplied amongst the air inlet points by providing a fixed dimension flow path from the manifold to each air inlet point,” as recited in claim 1.

Regarding claim 16, which recites “dividing the air supply amongst the air inlet points by sizing the air inlet points such that air is delivered in a desired fixed proportion,” the reference teaching of individually adjusting air flows teaches away from having delivering multiple air flows “in a desired fixed proportion.” For at least the same reason, the Kahlich reference is deficient regarding claim 21, which recites that “the fixed ratio [between air flow delivered to different air inlet points] remains constant when

the air pressure of the supplied air is varied according to a calculation based on a system map.”

For at least these reasons, Applicants submit that the claims 1, 16, and 21 are patentable over the Kahlich reference. Claims 2-7 are dependent from claim 1 and are patentable for at least the same reasons that claim 1 is patentable. Applicants respectfully request the withdrawal of the rejections over the Kahlich reference.

IV. Claim Rejections over the Heil reference

Claims 1-5, 7, 16, and 21 are rejected under 35 U.S.C. § 102(b) as anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over Heil (U. S. Patent No. 6,287,529). See Office Action at 3-4. Claim 1-7, 16, and 21 are also rejected under 35 U.S.C. § 103(a) as being unpatentable over Heil. *Id.* The Examiner asserts, among others, that “Heil teaches in col. 3 and col. 7 varying the oxygen supply at several places in a CO oxidation unit connected to a reformer.” *Id.* Applicants respectfully disagree.

Contrary to providing a fixed dimension flow path, as recited in claim 1, the Heil reference teaches “providing a desired temperature profile along the mixed gas stream within the carbon monoxide reactor, by **selectively adjusting** a flow volume of the oxidizing gas at at least one of said [air inlet] points along the mixed gas steam.” See Heil, claim 1 (emphasis added). Specifically, it teaches installing metering devices 4 in air flow paths to their respective air inlet points “to regulate or control the addition of oxidizing gas.” *Id.* at col. 3, lines 50-55, and Figure 1. One skilled in the art would appreciate that the meter devices are to be selectively and individually adjusted,

therefore fails to provide “a fixed dimension flow path from the manifold to each air inlet point,” as recited in claim 1.

With respect to claim 16, the Heil reference fails to teach or suggest “dividing the air supply amongst the air inlet points by sizing the air inlet points such that air is delivered in a desired fixed proportion.” See claim 16, as amended. This is because “selectively adjusting” one or more of several air inlet flows is inconsistent with the objective to maintain a fixed proportion among the multiple air flows.

Likewise, the Heil reference fails to teach or suggest having a fixed dimension flow path or “the fixed ratio [between air flows delivered to different air inlet points] remains constant when the air pressure of the supplied air is varied according to a calculation based on a system map.” See claim 21, as amended. Rather, all air flows in the Heil references are individually controlled by metering devices 4.

For at least the reasons set forth above, Applicants submit that the Heil reference teaches away from claims 1, 16, and 21. It neither anticipates nor renders these claims obvious. Claims 2-7 are dependent from claim 1 and are patentable for at least the reasons that claim 1 is patentable. Applicants respectfully request the withdrawal of the rejections.

V. Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

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By:

A handwritten signature in black ink, appearing to read 'M. D. Sweet', written over a horizontal line.

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